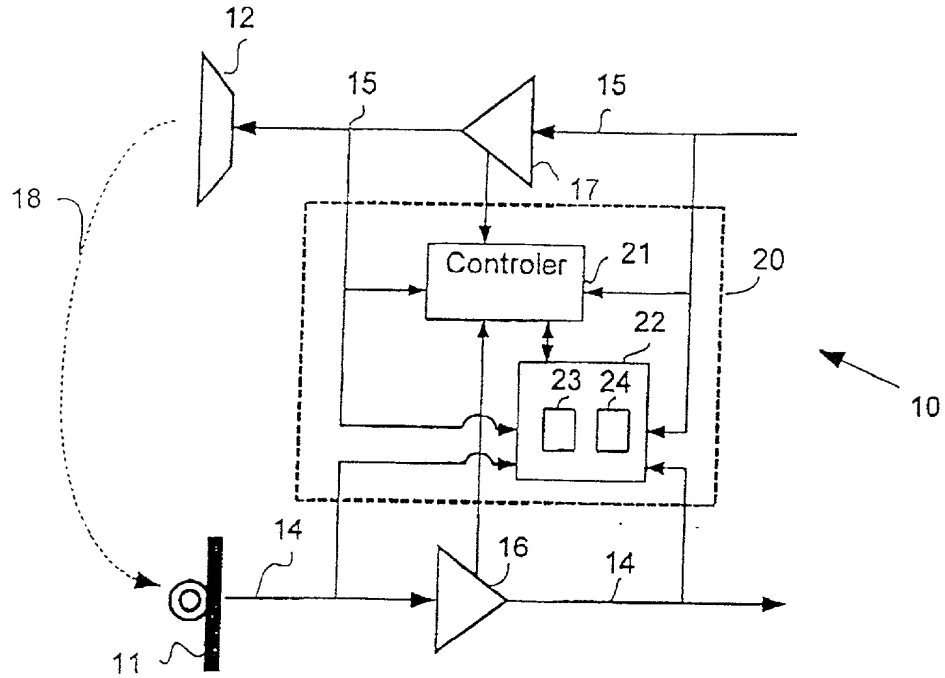
12
15
15
17
18
Controler
21
20
22
23
24
10
14
16
14
11

FIG. 1

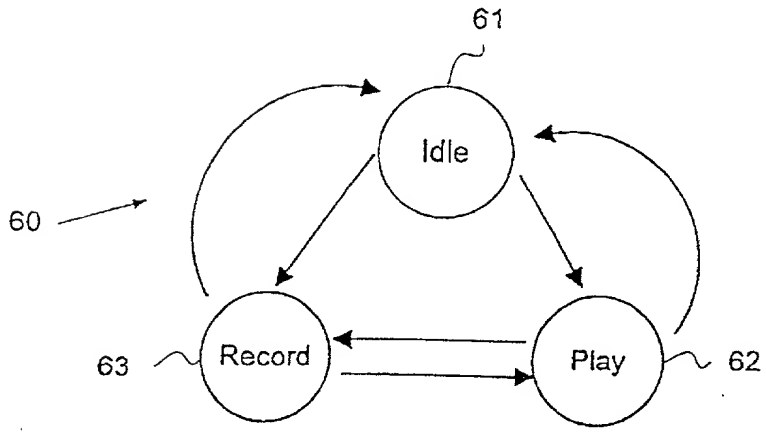
61
Idle
60
Record
Play
63
62

FIG. 3

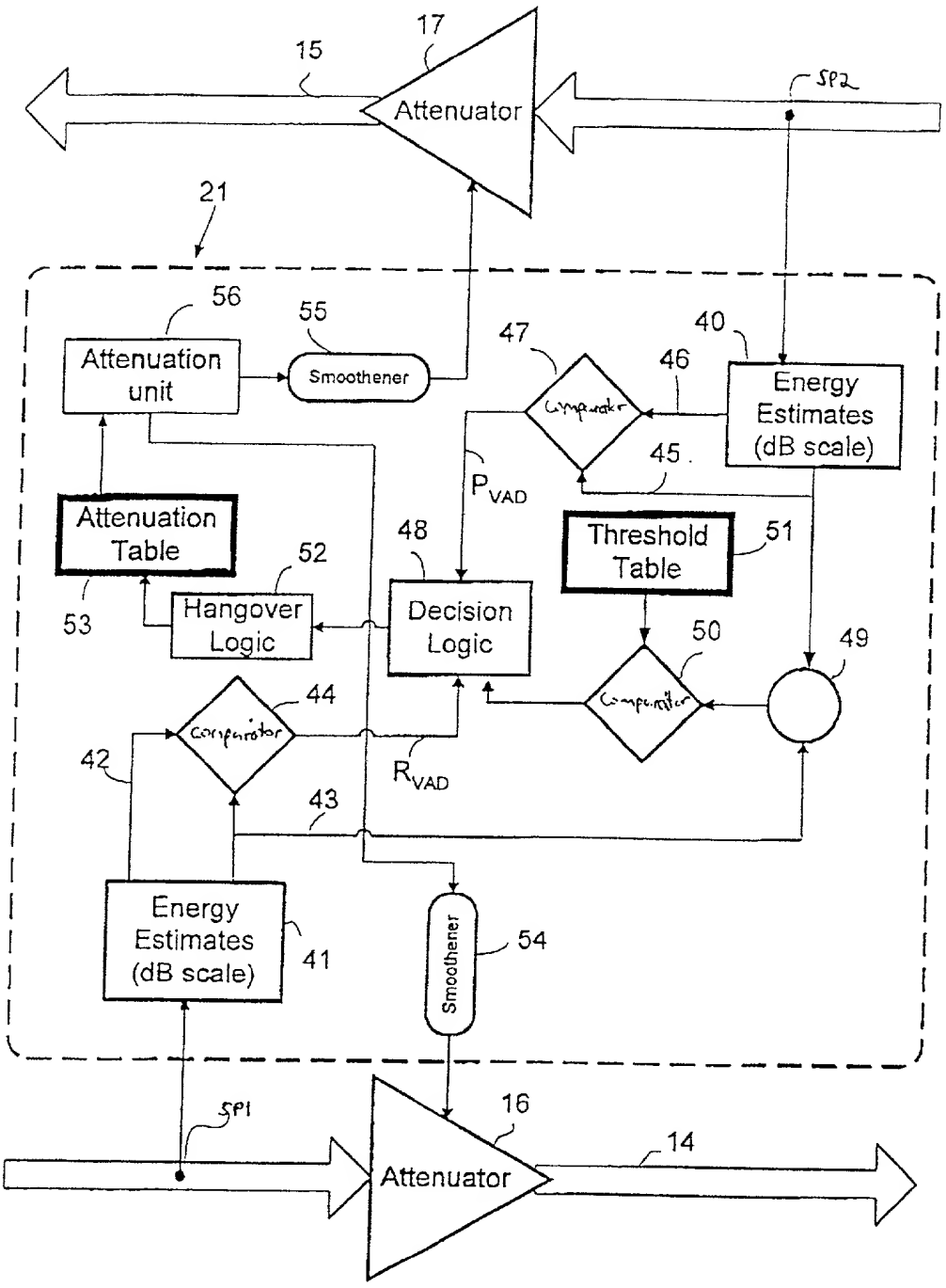
17
15
Attenuator
SP2
21
56
55
Attenuation unit
Smoothener
47
40
46
Energy Estimates (dB scale)
45
P_{VAD}
Attenuation Table
48
52
Threshold Table
51
53
Hangover Logic
Decision Logic
50
49
44
42
R_{VAD}
43
Energy Estimates (dB scale)
41
Smoothener
54
SP1
16
Attenuator
14

FIG. 2

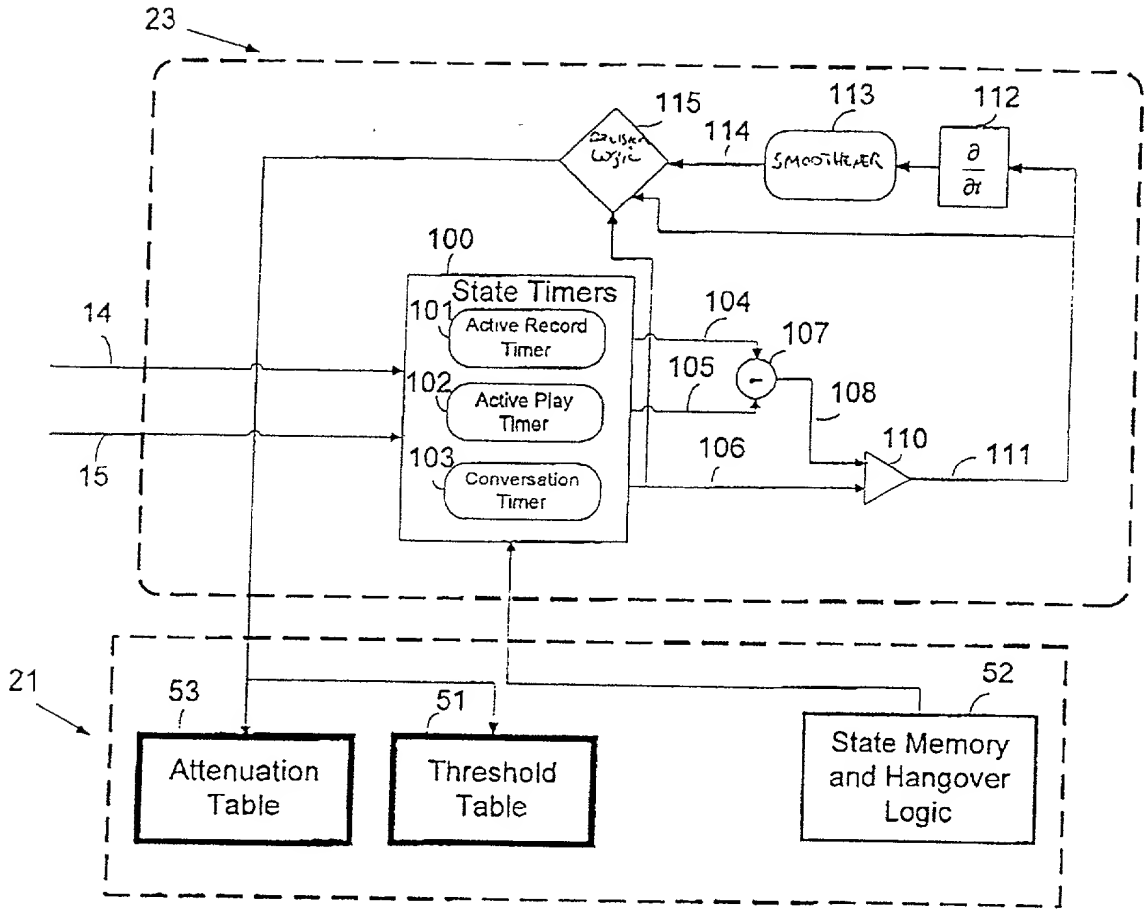
23
115
113
112
114
SMOOTHENER
$\frac{\partial}{\partial t}$
100
State Timers
101
Active Record Timer
102
Active Play Timer
103
Conversation Timer
14
15
104
107
105
108
110
111
106
21
53
51
52
Attenuation Table
Threshold Table
State Memory and Hangover Logic

FIG. 4

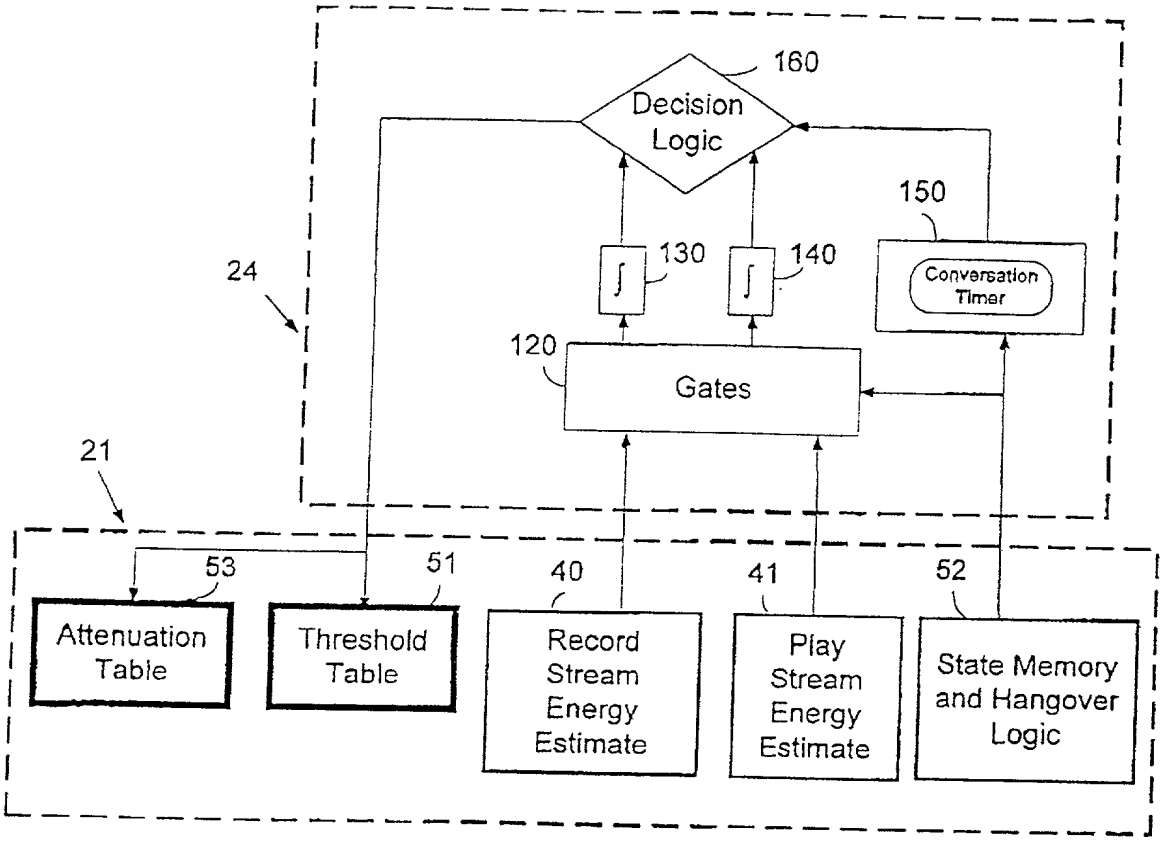
160
Decision Logic
150
130
140
Conversation Timer
24
120
Gates
21
53
51
40
41
52
Attenuation Table
Threshold Table
Record Stream Energy Estimate
Play Stream Energy Estimate
State Memory and Hangover Logic

FIG. 5

53a

Attenuation Table – Low Gain Mic

	Echo Suppression State		
	Idle	Record	Play
Play Stream (Rx)	-30dB	-42.5dB	-5dB
Record Stream (Tx)	-10dB	+5dB	-32.5dB

53b

Attenuation Table - Normal Mic

	Echo Suppression State		
	Idle	Record	Play
Play Stream (Rx)	-25dB	-37.5dB	0dB
Record Stream (Tx)	-15dB	0dB	-37.5dB

53c

Attenuation Table- High Gain Mic

	Echo Suppression State		
	Idle	Record	Play
Play Stream (Rx)	-20dB	-32.5dB	+5dB
Record Stream (Tx)	-20dB	-5dB	-42.5dB

53

FIG. 6

Patent - 5/5/2006

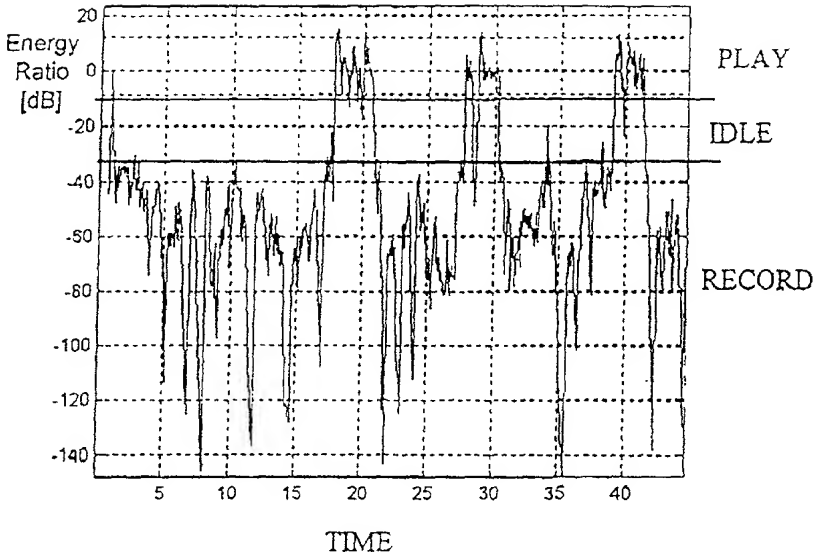

FIG. 7a

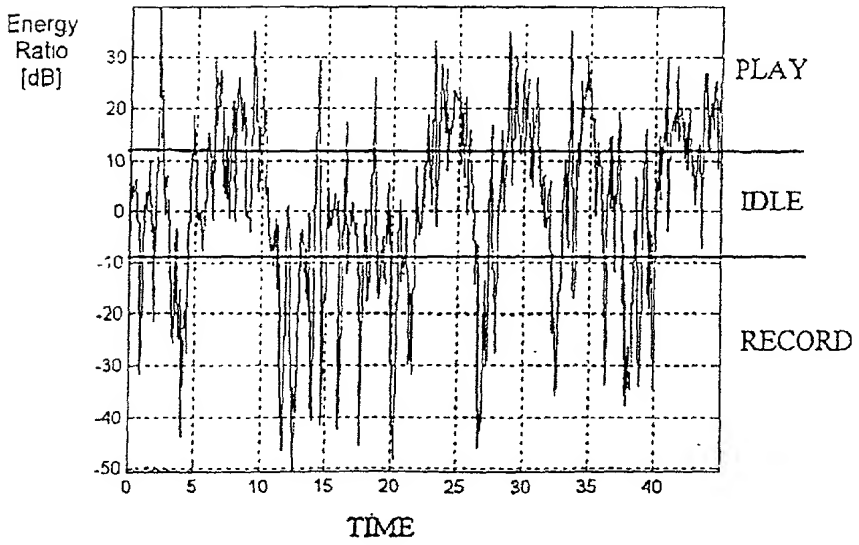

FIG. 7b

EP 1 545 154 A2

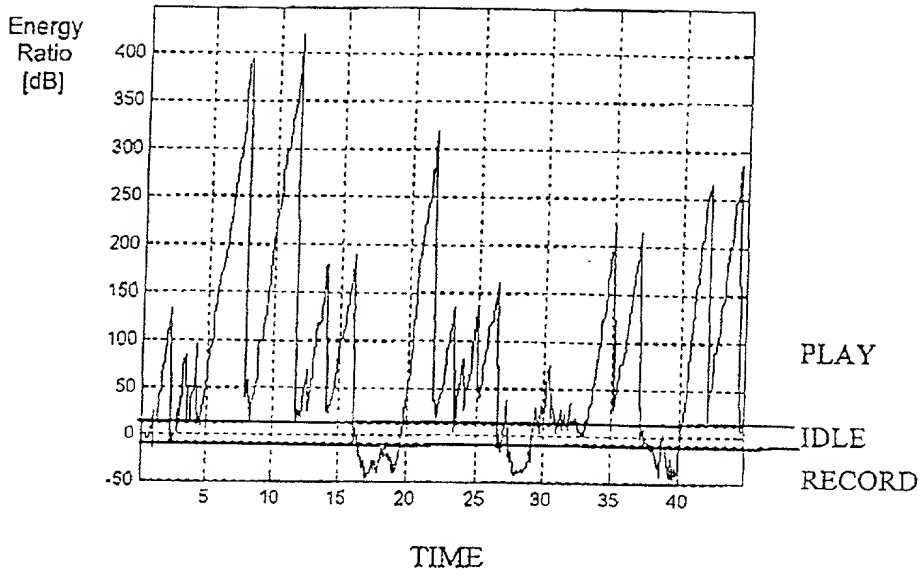

FIG. 7c

EP 1 754 360 A2

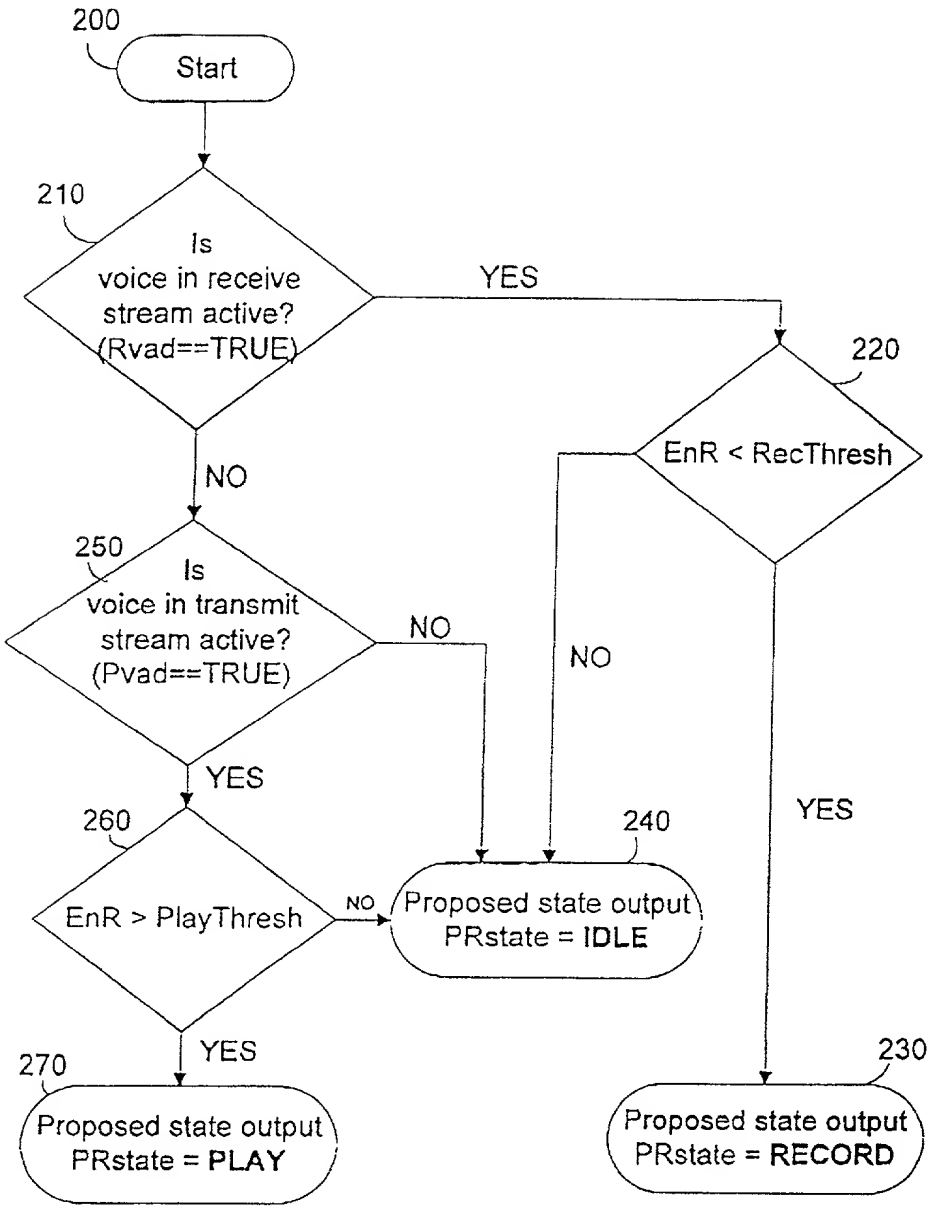
200
Start
210
Is voice in receive stream active? (Rvad==TRUE)
YES
220
EnR < RecThresh
NO
250
Is voice in transmit stream active? (Pvad==TRUE)
NO
NO
YES
260
EnR > PlayThresh
NO
240
Proposed state output PRstate = IDLE
YES
YES
270
Proposed state output PRstate = PLAY
230
Proposed state output PRstate = RECORD

FIG. 8

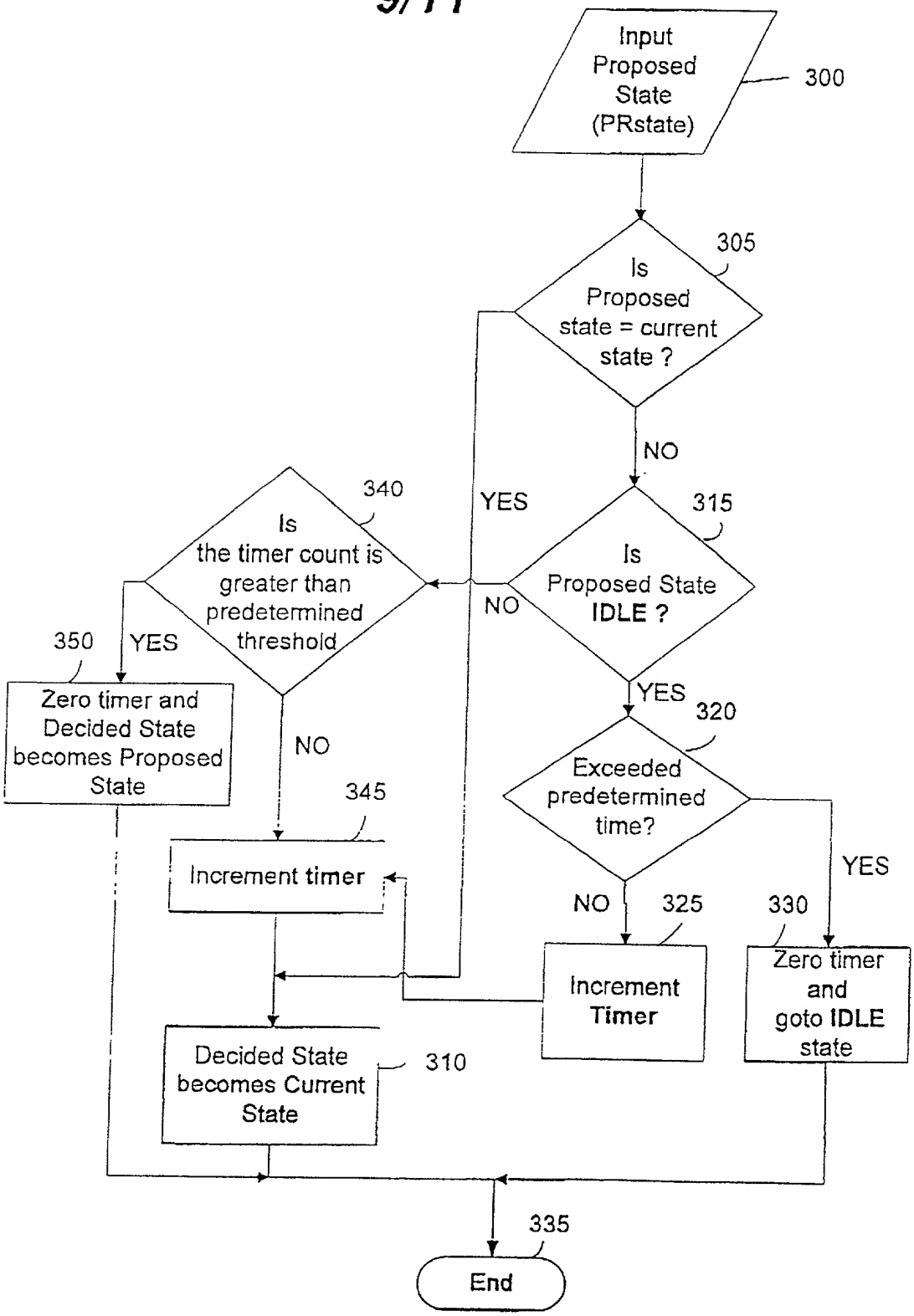
Input Proposed State (PRstate)
300
Is Proposed state = current state ?
305
NO
YES
Is Proposed State IDLE ?
315
NO
YES
Exceeded predetermined time?
320
NO
325
YES
330
Increment Timer
Zero timer and goto IDLE state
Is the timer count is greater than predetermined threshold
340
YES
350
Zero timer and Decided State becomes Proposed State
NO
345
Increment timer
Decided State becomes Current State
310
335
End

FIG. 9

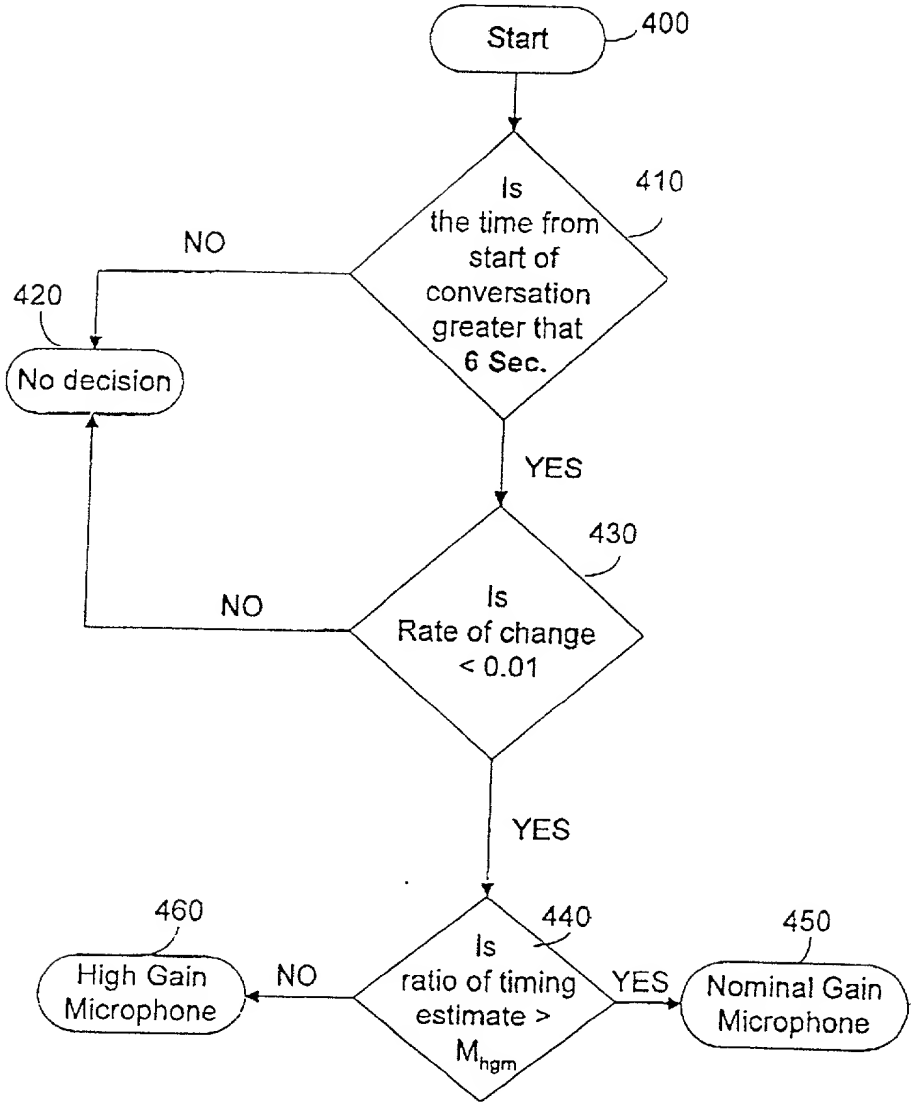
Start
400
Is the time from start of conversation greater that 6 Sec.
410
NO
420
No decision
YES
Is Rate of change < 0.01
430
NO
YES
Is ratio of timing estimate > M_{hgm}
440
NO
High Gain Microphone
460
YES
Nominal Gain Microphone
450

FIG. 10

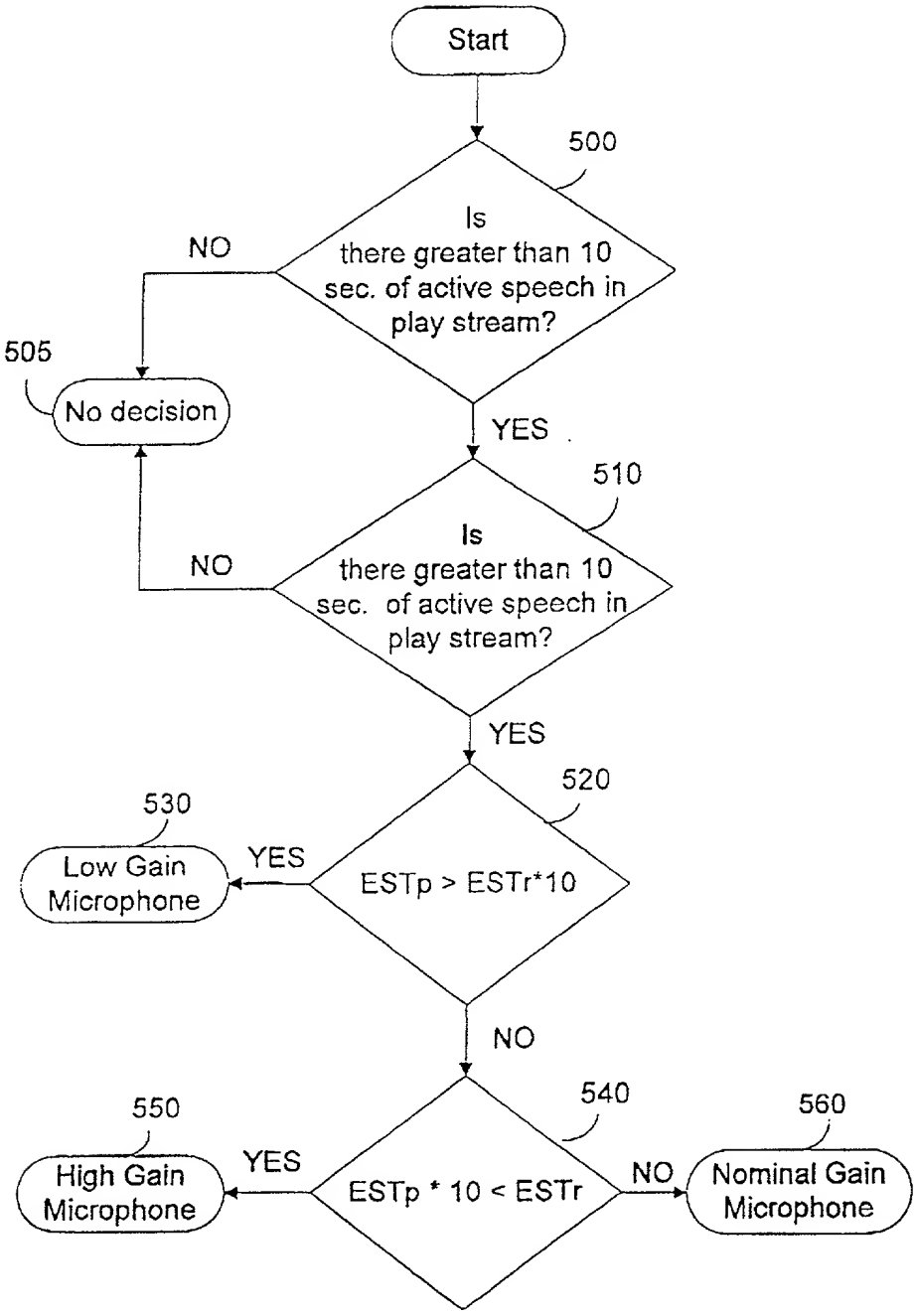
Start
500
Is there greater than 10 sec. of active speech in play stream?
NO
505
No decision
YES
510
Is there greater than 10 sec. of active speech in play stream?
NO
YES
520
ESTp > ESTr*10
530
Low Gain Microphone
YES
NO
540
ESTp * 10 < ESTr
550
High Gain Microphone
YES
NO
560
Nominal Gain Microphone

Fig. 11